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RUSSIA'S WAR-TIME OUTLETS TO THE SEA

When the war began, Russia was immediately cut off from her convenient connections with Great Britain and France by way of the railroad lines extending through Germany. Turkey soon closed the Dardanelles to Russia, and the Balkan rail and Mediterranean sea routes, formerly utilized by Russian trade, were no longer available. Petrograd is connected by rail through Vologda with Archangel on the White Sea, and Russia, as is noted below, is doing her utmost to increase the usefulness of that port. With the German fleet in the Baltic, Russia could not use this water highway to the west and she was thus hemmed in, as far as the Atlantic was concerned, unless it was practical to have her mails and commodities transferred across the neutral territories of Sweden and Norway.

What has been done to solve the problem is here condensed from a paper by C. Rabot, the well-known French geographer.¹ The plan, in brief, was so adequately to enlarge the present facilities for transferring passengers and freight between the railroad systems of Russia and the Scandinavian countries that Russia might have an outlet and inlet through their ports, thus permanently enlarging the commerce of Sweden and Norway.

Our map shows the railroad from Petrograd extending through Finland south of the Arctic Circle, touching at Gamla Karleby and Torneå, small ports on the Gulf of Bothnia, and connecting by rail with several other ports, including Hangö and Åbo. Within a few days after war was declared, in August, 1914, hundreds of travelers and some thousands of pieces of baggage and freight were collected at Karungi on the Swedish side of the Torne Elf and at Torneå on the Finnish side. The stations of Torneå and Karungi were about twelve miles apart. It was impossible to store the freight under roofs or to provide shelter and sufficient food for the crowd. Much suffering was unavoidable in the early weeks of the rush to the uninhabited wilderness, where two railroad systems have their termini.

As fast as possible more men were employed, and hotels, restaurants, and freight houses were erected. To increase the facilities for handling freight, Russia extended the Finnish line about twelve miles farther north to Karundi, opposite Karungi. This extension was completed on January 26, 1915. The transport of passengers and freight between the two railroad systems was thus reduced from over twelve miles to about two miles across the swamp and river between Karundi and Karungi. After many weeks, the Swedish terminus of Karungi was able to despatch one hundred cars a day; but even this facility did not meet the demands of business, and many laden cars were held up at stations along both the Swedish and Finnish lines, and even the Russian mails were at times delayed.

Then the Swedish authorities extended their railroad along the right shore of the Torne Elf between Karungi and Haparanda so that freight and passengers could be handled along tracks on both sides of the river. Trains have been running on this branch since July last, but it will be some time before the bridge connecting Haparanda with Torneå is completed. Meanwhile freight transports are plying between the two towns.

The situation has been wonderfully changed by these improvements, but until the bridge is completed the service is liable to be interrupted for short periods both at the beginning of winter and at the breaking up of the river ice in the spring. Traffic is also embarrassed by the fact that neither the Russian or Swedish railroad systems were built and equipped to handle the enormous amount of business that the war has developed between these countries. The rolling stock in Sweden is especially deficient. In March last the Swedish railroads needed 6,000 more freight cars than were then available to handle the business. At Gotenburg, the principal center of freight distribution in

¹ Les communications entre la Russie et l'Europe occidentale par la Scandinavie, *La Nature*, No. 2185, Vol. 43, 1915, Aug. 14, pp. 101-105. 3 maps.

Sweden, the docks and warehouses were packed with undelivered freight. All the Scandinavian railroads are single track, and this has increased the congestion of freight en route.

The junction of the Finnish railroad with the Swedish system has put Russia in touch with five Atlantic ports: Narvik, Trondhjem, Bergen, Christiania, and Gotenburg. The most northern, Narvik, is the sea terminus of the trans-Lapland railroad which was built twelve years ago to carry the iron ore of the great mines of Gellivare and Kiruna to this ice-free port for shipment. Its advantages are that it is the shortest rail route between Petrograd and the Atlantic, about 1,150 miles; it is not subject to the delays that occur on the north-south trunk line of Sweden; and there is no deficiency of cars to carry imports, as the ore-carrying cars return eastward empty. Two steamship companies maintain regular service between Narvik and England.

Trondhjem, Norway, a busy port, has regular connections by the Wilson Line with Hull, England.

The third route passes through Christiania, the capital of Norway and leads on to Bergen. This route carries the mail and passengers destined for Russia. During the last four months of 1914 the Bergen railroad carried at least 50,000 persons going to Russia or coming from it. The distance between Bergen and Petrograd is 1,819 miles via Hallsberg. The journey between London and Petrograd takes a week.

The fourth port is Christiania and the fifth is Gotenburg, the largest port of Sweden. Through these ports passes most of the freight going to or coming from Russia, partly because they are most frequented by ocean liners and also because the heavy grades of the Bergen line make freight transportation slower than via the other two ports.

Russian transit is using not only railroads in Sweden and Norway but also, to some extent, the sea route through the Gulf of Bothnia. This gulf is almost isolated from the rest of the Baltic by the Åland Archipelago. Between this jumble of islands, islets, and reefs, prolonging Finland into the sea, and the coast of Sweden, there is only one wide passage, the Ålands Haf, so sown with dangers that any false move invites disaster. German warships do not venture into these waters, but an occasional submarine from one or another of the German Baltic ports has made dangerous the approaches to Åbo and other southwestern Finnish ports. A number of steamers have been destroyed by mines especially in the waters around Åbo.

Meanwhile, Archangel, as, prior to this winter, the only port of European Russia still open to trade, has sprung into great prominence.² Last summer there were about 120 steamers in port. Many boats and barges were also engaged in river and canal navigation, some of them carrying as much as 2,000 tons each. The Northern Dvina River at Archangel is one to three miles wide, with a depth of twenty to forty feet. The White Sea tide rises about three feet. The depth of water at the piers is usually twenty-two feet or more at low tide. Over one hundred large warehouses have been built within a year. There are still too few piers and warehouses, and ships arriving sometimes have to lie out in the stream for weeks before they can unload. One American steamer took five weeks to discharge its cargo.

Large preparations are planned to meet next spring's traffic, and it is hoped that facilities may then be sufficient to take care of the enormous business. If Archangel were free from ice in winter it would be one of the finest ports in the world, as it has over sixty miles of river frontage available for ships drawing up to twenty-three feet. Moreover, through the system of inland waterways with which the Northern Dvina River is connected, it is possible to ship freight from Archangel by water to nearly all the principal towns of Russia.

The river begins freezing in October, but it is hoped to keep the White Sea open a month or two later. Two of the largest ice breakers are now at Archangel, the *Canada*

² H. D. Baker: Rapid Progress of the Port of Archangel, *Commerce Repts.*, Oct. 18, 1915, pp. 254-260 (abstracted in *Bull. Geogr. Soc. Philadelphia*, Vol. 14, 1916, No. 1, pp. 24-29); Further Improvements at Archangel, *Commerce Repts.*, Nov. 1, 1915, pp. 450-452.

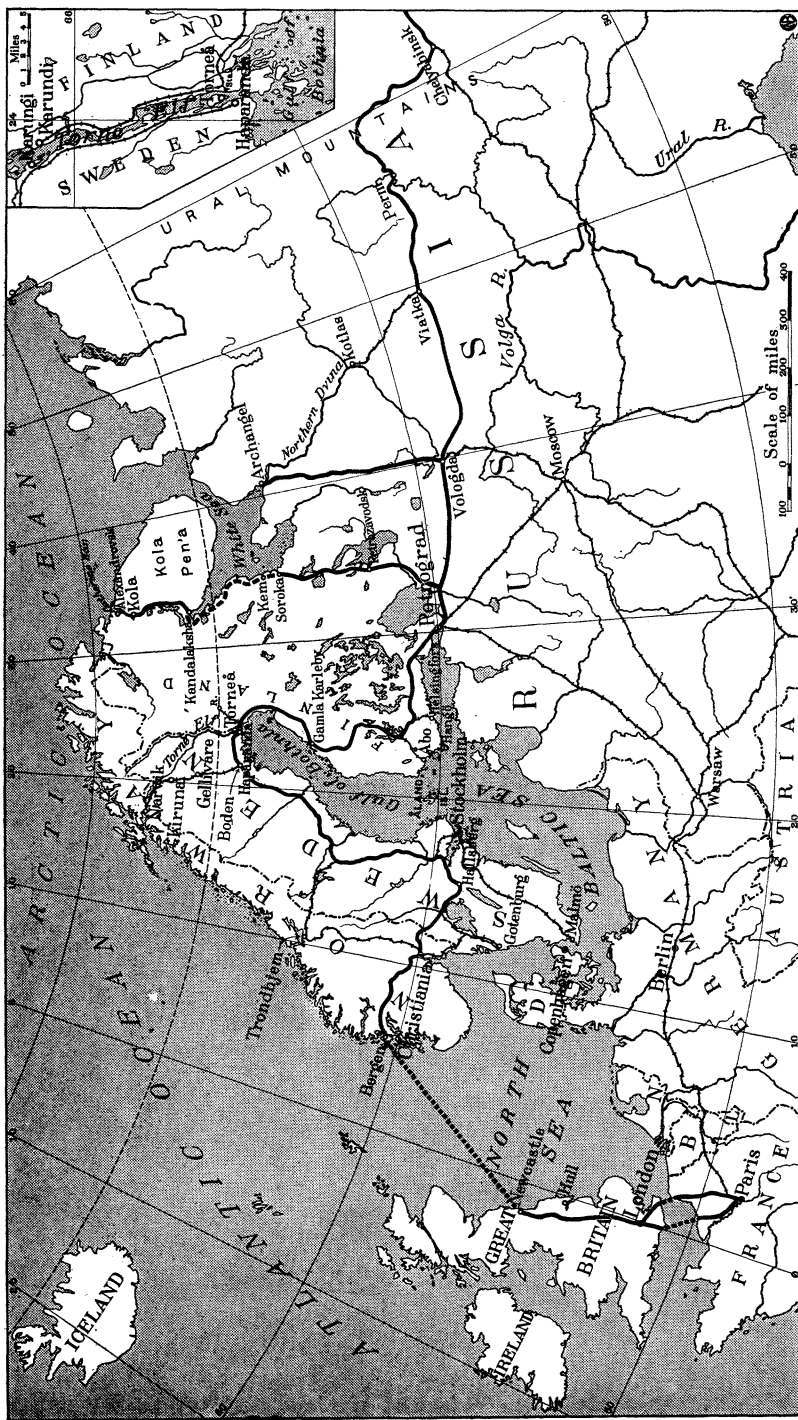


FIG. 1.—Sketch-map of Russia's war-time outlets to the sea in northern Europe. Scale, 1:24,500,000. The inset shows the junction of the Russian and Swedish railroad systems. The railroads leading to the main outlets, Archangel, Kola, and Bergen, are shown in heavy lines; other railroads, in lighter lines with cross-ticks.

and *Lintrose*, and several more are being constructed in England for use during the winter. In the latter part of the season incoming ships may be allowed, as they were last year, to freeze in, unloading their cargoes on the ice.

The railroad connection of Archangel with the interior has also been materially improved. The single-track narrow-gage line, 395 miles long, which connects the port with the main railroad system at Vologda, has been changed to standard gage. North from Nyandoma, half-way between Archangel and Vologda, a parallel single track has been built, while south of this point the present tracks have been widened. The freight cars that can now be used have a capacity of fourteen as against ten tons (of 2,240 pounds) with the former equipment. In addition to the consequent heavier freight movement, there will be a great saving of time, as it will be possible to run cars from all parts of Russia and Siberia through to Archangel without transshipment at Vologda.

In spite of this larger capacity of Archangel, the fact that, even by using ice-breakers, the port cannot be kept open for three to four months has revived the plan of providing Russia with an outlet by means of the ice-free stretch of Arctic coast which extends immediately east of the northernmost part of Norway. Here an offshoot of the Gulf Stream drift, which rounds North Cape, keeps the waters open the year round. Catherine Harbor, a deep estuary which extends for 27 miles into the land, affords an ideal haven for shipping. At its head lies Kola, until recently a settlement of fishermen and fur hunters. From here a double-track railroad has been under construction during the past months to Petrograd, about 815 miles distant. According to latest reports the essential parts have been finished in time to replace the Archangel route during the present winter.³

Construction has not been easy. The line passes through the glaciated, lake-studded region of northwestern Russia. Many miles of road had to be built on piles, and through long stretches of swamp and morass a firm roadbed had first to be provided. The swarm of mosquitoes and midges characteristic of Arctic summers made the work particularly trying. Nevertheless progress was made at a remarkable rate, and the line was completed three weeks before contract time.⁴

The line strikes due south across the neck of the Kola Peninsula to Kandalaksha, at the northwestern tip of the White Sea, a distance of 179 miles. It then skirts the western border of the White Sea to Soroka, at its southwestern extremity, a distance of 258 miles. From here it continues southward to Petrozavodsk on Lake Onega, a distance of 237 miles, and then runs south-southwest to Svanka, a station on the main trunk line east from Petrograd, and reaches the capital in about 240 miles more. The line is reported to be completed except for the section along the western border of the White Sea. Between the end-points of this section, Kandalaksha and Soroka, it is proposed to maintain traffic by water by means of three ice-breakers, one of 2,500-ton and two of 500-ton capacity, which will likewise serve as cargo boats. The ice along the west coast of the White Sea is of very light formation and affords no such obstacle as the heavy ice which is forced into the entrance to the White Sea by northerly and northeasterly winds and effectually bottles up Archangel during the winter.

Owing to the limited capacity of the ice-breakers this route will probably be reserved for freight urgently required by the government. Private freight arriving at Kola during the winter will be moved as far south as Kandalaksha by rail and can then be transported westward a distance of 140 miles by sledge to Rovaniemi, a town on the Arctic circle (indicated by R on the map) at the end of a branch from the Finnish railroad around

³ The Railway to the Murman Coast of Russia, *Commerce Repts.* (from the *London Times Russian Supplement*, Oct. 30), Dec. 9, 1915, pp. 970-973, with map. See also North Winship: Existing and Proposed Russian Arctic Ports, *Commerce Repts.*, March 19, 1915, pp. 1109-1111; H. D. Baker: *op. cit.* in footnote 2 (References on pp. 257 and 450); Verbinding van St. Petersburg (Petrograd) met de Noordelijke IJszee, *Tijdschr. Kon. Nederl. Aardrijksk. Genoot.*, Vol. 32, 1915, No. 7, p. 889; Järnvägen Petrograd-Ishafskusten, *Ymer*, Vol. 35, 1915, No. 3, p. 298; Fertigstellung der Eisenbahnlinie Petersburg-Kola-Katharinenhafen?, *Weltwirtschaft*, Vol. 5, 1915, No. 8, p. 170.

⁴ Article in the *New York Sun*, Jan. 9, 1916.

the Gulf of Bothnia. Even when the uncompleted section of the railroad has been finished the Kola route will hardly, in summer at least, replace the Archangel route, because of the shorter railway haul on the latter. However, Soroka and the important coast town of Kem, 35 miles north, can serve as additional ports of entry to relieve any congestion on the Archangel route. With this in view, dredging and construction work have been under way during the past months at these two ports.

Such are the means by which Russia has broken through the bonds imposed on her by the war and gained an unobstructed access to the western sea. To the east her communication with the Pacific, by means of the Trans-Siberian railroad, has not been hindered, but obviously a single line, many thousands of miles in length, cannot properly serve her needs. Russia has thus been forced to create new lines of communication with the western world. While these are in part circuitous and one, the Kola route, only inadequately satisfies Russia's age-long desire to reach an ice-free coast, they will contribute permanently to the economic welfare of the Empire.

THE WASHINGTON MEETING OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS

The twelfth annual meeting of the Association of American Geographers was held at Washington, D. C., December 30-31, 1915, and January 1, 1916. Forty-one members were present and more than that number of invited guests.

Of the forty papers announced, the following twenty-five were read. In most cases, brief characterizations of the papers are given, based on abstracts supplied by the authors.

GENERAL

WILLIAM BOWIE (introduced)—*The Place of Geodesy in Scientific Geography.*

Geodesy is essential in the determination of the shape and size of the earth. From the data secured from geodetic observations we are enabled to determine approximate deviations from the normal in the densities in the outer portions of the earth. By means of triangulation and geodetic leveling the fundamental control in position and elevation is obtained for surveys and maps.

DORA KEEN (introduced)—*Avalanches as a Factor in the Alimentation of Glaciers.*

WILLIAM G. REED—*The Probability of Specified Meteorological Conditions.*

A knowledge of the "business risk" from unfavorable weather conditions is essential for successful farming. The "probability curve" may be used to determine this risk. As an illustration of what may be done a map of the dates after which killing frost will occur only one year in ten on the average was shown. Similar maps have been made for autumn frosts and for the probable season without killing frost four years in five.

ELLSWORTH HUNTINGTON—*Geographic Variables.*

Every geographer recognizes that the effect of geographic environment varies. This variation has two aspects. In the first place man's own capacities vary greatly from region to region and in different stages of development. Therefore a region such as the grassy prairies, which at one stage presents an insuperable obstacle to agriculture, may in a later stage become the region where agriculture is most profitable. The second type of variation is due to the fact that certain phases of geographic environment, especially the climatic conditions, change markedly from year to year and cycle to cycle. The work of Clayton on rainfall and panics, of Brückner on rainfall and migrations, of the British officials in India on famines, birth-rates, crime, and social conditions, of Moore on crops and economic cycles in the United States, and of Dexter on weather